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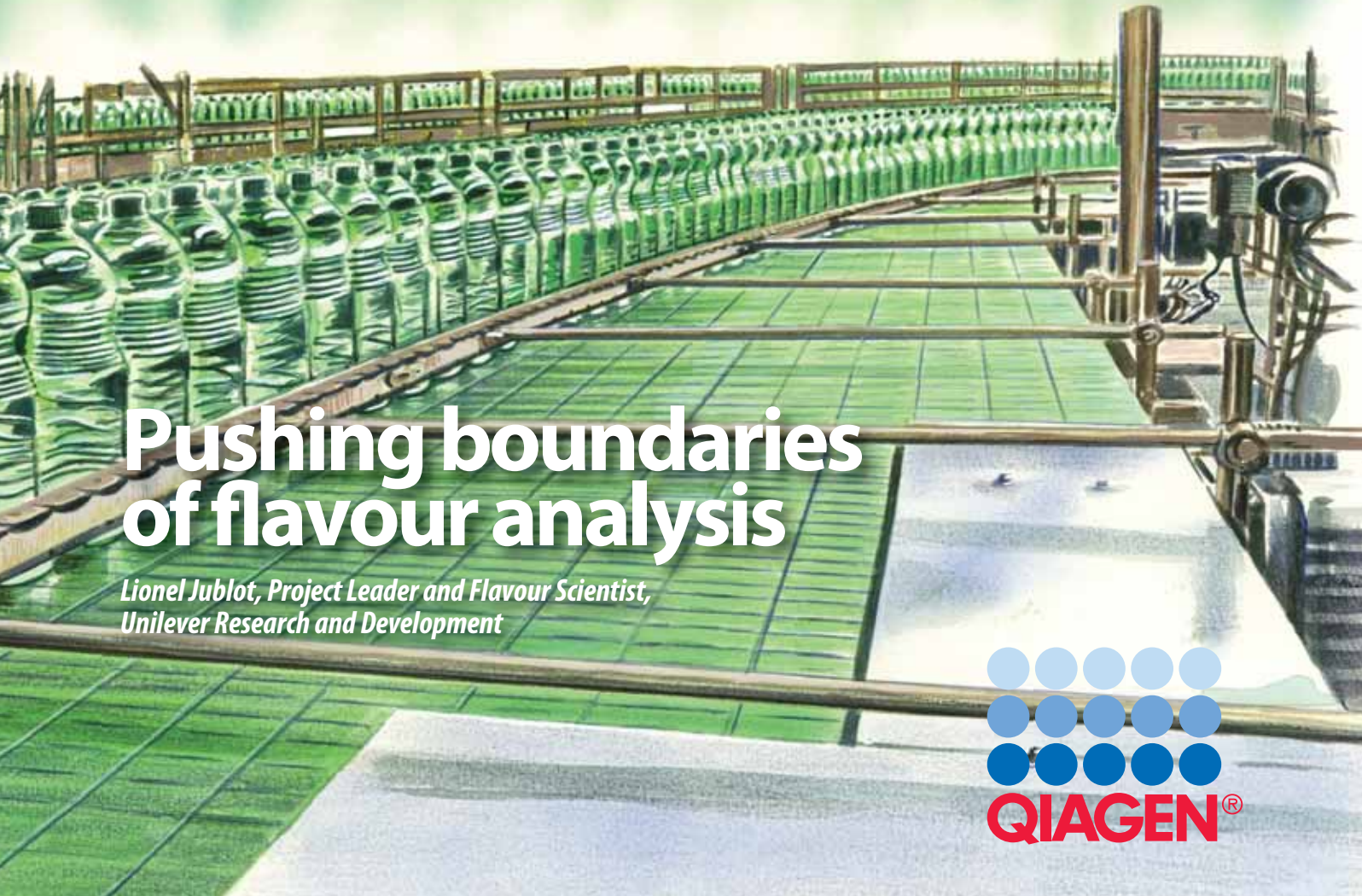
Facing the future challenges to microbial food safety

Laurence Blayo, Group Leader Food Safety Microbiology, Nestlé Research Centre

Validation of aseptic packing machines

Giampaolo Betta, Head of Food Science and Technology, University of Parma



Pushing boundaries of flavour analysis

Lionel Jublot, Project Leader and Flavour Scientist, Unilever Research and Development

In a nutshell...

Helen Difford, Editor, speaks exclusively to
Sandra Luley, Marketing Manager – Applied Testing, QIAGEN

Founded in 1984 as a spin-off company from the University of Düsseldorf, QIAGEN has grown into a market leader for sample and assay technologies. Providing solutions to diagnostic labs, pharmaceutical and biotechnology companies and academics, QIAGEN recently launched their first dedicated food safety test kit at the end of 2010. "We're perceived as being newcomers to the food market, but we've been developing PCR technology for a long time," Luley explains. "A move into the food market was a natural one for us, as we already supply a broad range of analysis products to other industries. We're moving very fast in this market and it's a great opportunity for our company to grow."

With the increased globalisation of the food industry over the past few decades, food safety testing is more important now than ever. Food is produced in larger amounts than ever before and food storage times are reduced to enable rapid and long distance transportation. "Now, if there are any pathogen outbreaks, it can quickly affect a large population or region because of food globalisation," Luley admits. "Sensitive and fast testing methods which can track the source of the outbreak is a necessity. It puts increasing demands on today's testing methods."

QIAGEN's food safety tests are currently based on PCR technology, recently refined to make it suitable for use in food safety testing. "It's one of the key technologies in food safety testing," Luley says. "It's a method that can be applied on a broad range of targets. You can detect pathogens, genetically modified organisms and allergens or authenticate ingredients. It's fast, efficient, safe and reliable."

PCR, or Polymerase Chain Reaction, is a method used to amplify pieces of DNA, either by end-point PCR (detecting the DNA pieces at the end of the process) or real-time PCR, which detects DNA pieces during the amplification process. RT-PCR makes detection much faster and more accurate than end-point PCR.

"One of the major benefits of real-time PCR is the speed, especially when compared to traditional microbiology or culture-based methods," Luley notes. "It's also a highly specific technology, enabling the detection of specific bacterial strains that are difficult to isolate and detect with traditional microbiology. With PCR, you are able to design an assay specific to a special or rare bacterial strain. Commercially available products cover the entire workflow from sample preparation to result. Another advantage is the flexibility of PCR towards a wide range of sample matrices, which is important because of the broad number of different food types. It's also a robust method." Automation has also created a more straightforward process for higher throughput using PCR. With automated instruments for sample preparation, assay setup and PCR-based detection, several hundred samples can be tested in 24 hours, following an overnight pre-enrichment, which can be carried out by any qualified laboratory worker.

There are, however, some challenges with the technology. Some processed foods and special food types contain so-called inhibitory substances which can inhibit the PCR reaction. "Reagents have to be of high quality and developed in such a way that they are robust enough to cope with those inhibitory substances," Luley explains. "For successful real-time PCR, it is also crucial to have efficient procedures and kits for sample preparation and DNA extraction. These are the prerequisites for sensitive target detection."

"There is an increasing demand from regulatory authorities on food safety testing systems, so the market will continue to grow, with shorter time-to-results technology and higher grades of automation," Luley suggests. "Shortening the pre-enrichment step, which is growing bacteria for at least 24 hours before detection by PCR can be carried out, is one of the innovations that is currently being addressed. While PCR is very sensitive, it can't distinguish between living or dead bacteria, so striving to turn PCR into a method that can make this distinction and shorten the pre-enrichment step would drive down the time to results by at least 24 hours."

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